WHAT IS CLAIMED IS:

1. A spin valve sensor for use with a data storage system to produce a giant magnetoresistive (GMR) effect in response to applied magnetic fields, the sensor comprising:

a sense current (I), which is horizontally oriented in a longitudinal direction;

a first ferromagnetic free layer having a magnetization (M_1) in a first direction that is aligned in the longitudinal direction of the sense current, when the first ferromagnetic free layer is in a quiescent state;

a second ferromagnetic free layer having a magnetization (M_2) in a second direction that is anti-parallel to the first direction, when the second ferromagnetic free layer is in a quiescent state;

a spacer layer between the first and second ferromagnetic free layers;

a biasing component producing a bias magnetization field that biases both M_1 and M_2 in a third direction that is transverse to the first and second directions thereby establishing quiescent bias states for M_1 and M_2; and

wherein M_1 produces a first demagnetization field that biases M_2 in the second direction and M_2 produces a second demagnetization field that biases M_1 in the first direction when the first and second ferromagnetic free layers are in their quiescent

states, and M_1 and M_2 rotate about their quiescent bias states in response to an applied magnetic field thereby producing a GMR effect in the sensor as a function of the rotation of M_1 and M_2.

2. The spin valve sensor of claim 1, wherein the biasing component is a permanent magnet having a magnetization in the third direction and positioned above the first and second ferromagnetic free layers.

3. The spin valve sensor of claim 1, wherein the biasing component includes:

a first anti-ferromagnetic layer exchange coupled to the first ferromagnetic free layer; and

a second anti-ferromagnetic layer exchange coupled to the second ferromagnetic free layer.

4. The spin valve sensor of claim 1, wherein the third direction is selected from a group consisting of downward and upward.

5. The spin valve sensor of claim 1, including first and second contacts respectively positioned in contact with first and second ends of the first and second ferromagnetic free layers and the spacer layer, wherein the sense current flows between the first and second contacts in the longitudinal direction.

6. The spin valve sensor of claim 5, including:

a bottom shield proximate the first ferromagnetic free layer and the contacts; and

a top shield proximate the second ferromagnetic free layer and the contacts;

wherein the bottom and top shields have a substantially uniform shield-to-shield spacing.

7. The spin valve sensor of claim 1, wherein M_1 and M_2 are oriented in a direction that is about 45° relative to the sense current.

8. A data storage system including a spin valve sensor in accordance with claim 1.

9. A method of sensing an applied magnetic field, comprising steps of:

(a) providing a first ferromagnetic free layer having a magnetization (M_1) in a first direction that is aligned with a sense current (I) in a longitudinal direction, when in a quiescent state;

(b) providing a second ferromagnetic free layer having a magnetization (M_2) in a second direction that is anti-parallel to the first direction, when in a quiescent state;

(c) applying a bias magnetic field to the first and second ferromagnetic free layers thereby angling M_1 and M_2

toward a third direction that is transverse to the first and second directions and establishing a quiescent bias state; and

(d) allowing M_1 and M_2 to rotate about their quiescent bias states in response to an applied magnetic field whereby a GMR effect is produced as a function of the rotation of M_1 and M_2.

10. A spin valve sensor comprising:

a sensor stack adapted to receive a sense current; and

a magnetic field sensing means for adjusting the electrical resistance of the sensor stack in response to an applied magnetic field thereby causing a GMR effect in the sensor stack.